A tensor is a view of a storage, which is a low-level 1d vector.

```python
>>> x = torch.zeros(2, 4)
>>> x.storage()
0.0
0.0
0.0
0.0
0.0
0.0
0.0
0.0
[torch.FloatStorage of size 8]
>>> q = x.storage()
>>> q[4] = 1.0
>>> x
tensor([[ 0., 0., 0., 0.],
        [ 1., 0., 0., 0.]])
```
Multiple tensors can share the same storage. It happens when using operations such as view(), expand() or transpose().

```python
>>> y = x.view(2, 2, 2)
>>> y
tensor([[ 0.,  0.],
         [ 0.,  0.],
         [ 1.,  0.],
         [ 0.,  0.]])
>>> y[1, 1, 0] = 7.0
>>> x
tensor([[ 0.,  0.,  0.,  0.],
         [ 1.,  0.,  7.,  0.],
         [ 3.,  3.,  3.,  3.]])

The first coefficient of a tensor is the one at storage_offset() in storage(). To increment index $k$ by 1, you have to move by stride($k$) elements in the storage.

```python
>>> q = torch.arange(0, 20).storage()
>>> x = torch.empty(0).set_(q, storage_offset = 5, size = (3, 2), stride = (4, 1))
>>> x
tensor([[ 5.,  6.],
         [ 9., 10.],
         [13., 14.]])
```
We can explicitly create different “views” of the same storage

```python
>>> n = torch.linspace(1, 4, 4)
>>> n
tensor([ 1., 2., 3., 4.])
>>> torch.tensor(0.).set_(n.storage(), 1, (3, 3), (0, 1))
tensor([[ 2., 3., 4.],
        [ 2., 3., 4.],
        [ 2., 3., 4.]])
>>> torch.tensor(0.).set_(n.storage(), 1, (2, 4), (1, 0))
tensor([[ 2., 2., 2., 2.],
        [ 3., 3., 3., 3.]])
```

This is in particular how transpositions and broadcasting are implemented.

This organization explains the following (maybe surprising) error

```python
>>> x = torch.empty(100, 100)
>>> x.stride()
(100, 1)
>>> y = x.t()
>>> y.stride()
(1, 100)
>>> y.view(-1)
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
RuntimeError: invalid argument 2: view size is not compatible with input tensor’s size and stride (at least one dimension spans across two contiguous subspaces).
```

\( \text{x.t()} \) shares \( \text{x} \)’s storage and cannot be “flattened” to a 1d without a memory copy.

This can be fixed either by using \text{contiguous()}, which returns a contiguous version of the tensor, making a copy if needed, or directly with \text{reshape()} which combines contiguous and view in one operation.